

Fact $I^3 = \langle \prod_{\alpha=1}^3 (g_i - 1) \mid g_i \text{ generates } F_n \rangle$

$V =$ generated by $\underline{\langle v_m \rangle}$ rep of wPB_{n+1} \leftarrow representative
 $X \otimes V \in I^3 \otimes V$ \leftarrow action

$$\sigma_{ij} \curvearrowright I^3 \otimes_{\mathbb{Q}(F_n)} V$$

$$\sigma_{ij}(X \otimes V) = \underline{X^{\sigma_{ij}}} \otimes \sigma_{ij} \cdot V$$

$X \in I^3 \subseteq F_n \hookrightarrow wPB_{n+1}$

$$\sigma_{ij}(g_k) = \begin{cases} g_i^{-1} g_j g_i & \text{if } j=k \\ g_k & \text{ow} \end{cases}$$

$$w[1, 2, -1, -2] \sim g_1 g_2 g_1^{-1} g_2^{-1}$$

$$w_{\text{simp}}[w_w] := w // w[l_--, i_-, j_-, r_--]$$

\swarrow $i+j=0 \Rightarrow w[l, r]$

$$w1_w ** w2_w := \text{Join}(w1, w2) // w_{\text{simp}}$$

$$0 ** _ := 0 \quad (a_ + b_) ** c_ := a_ ** b_ + b_ ** c_$$

$$\overline{x} := x - 1 \quad \text{Bar}[w[_]] \sim w[_]$$

$$\text{BSimp}[\text{Bar}[w[i_-, is_--]]] = \text{BSimp}[_]$$

$$w ** \text{Bar} := \dots$$

$$\text{Bar}[_] . w$$

$$g x - 1 = (0 - 1) x + x - 1$$

$$\text{Bar}[w[i]] ** w[is] + \text{Bar}[w[is]]$$